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May 25-26, 2017 Osaka, Japan

Scientific Tracks & Abstracts **(Day 1)**



Aquaculture Technology & Engineering Applications | Advances in Aquaculture Nutrition | Diseases in Aquaculture | Aquaculture Economics | Aquatic Resources & Environment Management | Biotechnology & Genetics in Aquaculture

Session Chair
Sadiqul Awal
Melbourne Polytechnic, Victoria Australia

Session Chair
W.M.T.B. Wanninayake
Wayamba University of Sri Lanka

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Sardine oil as a source of lipid in the diet of giant freshwater prawn, *Macrobrachium rosenbergii*A T Ramachandra Naik¹, H Shivananda Murthy² and H N Anjanayappa¹¹College of Fisheries, Mangalore, India²Karnataka Veterinary, Animal and Fisheries Sciences University, India

The freshwater prawn, *Macrobrachium rosenbergii* is a more popular crustacean cultured widely in monoculture system in India. It has got high nutritional value in the human diet. Hence, understanding its enzymatic and body composition is important in order to judge its flesh quality. Fish oil specially derived from Indian oil sardine is a good source of highly unsaturated fatty acid and lipid source in fish/prawn diet. A 35% crude protein diet with graded levels of Sardine oil as a source of fat was incorporated at four levels viz, 2.07, 4.07, 6.07 and 8.07% maintaining a total lipid level of feed at 8.11, 10.24, 12.28 and 14.33% respectively. Diet without sardine oil (6.05% total lipid) was served as basal treatment. The giant freshwater prawn, *Macrobrachium rosenbergii* was used as test animal and the experiment was lost for 112 days. Significantly higher gain in weight of prawn was recorded in the treatment with 6.07% sardine oil incorporation followed by higher specific growth rate, food conversion rate and protein efficiency ratio. The 8.07% sardine oil diet produced the highest RNA: DNA ratio in the prawn muscle. Digestive enzyme analyses in the digestive tract and mid-gut gland showed the greatest activity in prawns fed the 8.07% diet.

Biography

A T Ramachandra Naik is currently working as Associate Professor at College of Fisheries, Mangalore, and Karnataka Veterinary, Animal and Fisheries Sciences University, Karnataka, India. He has over 10 years of teaching, research and extension experience in the area of Aquaculture, Fish Nutrition, Marine Biology, Fish Diversity and Aquatic Environment Management. He has visited Michigan State University, East Lansing, USA in connection with 'e-Content Development in Fisheries' and involved in e-Content Development for BFSc degree program in India. He has served as Assistant Director of Students' Welfare and currently holding the charge of NSS Programme Officer of the college. During the tenure of 10 years, he has undergone several trainings viz, Recent advances in freshwater aquaculture nutrition, Aquaculture for livelihood and solar drying, Wildlife conservation and management, Entrepreneurship development, Write-shop for success stories, Scientific report writing and presentation, Multimedia content development, e-content management, Life skills development, etc. He has conducted 10 village stays and NSS annual special camps during the period of his tenure as faculty of fisheries. Besides, he has guided 5 MFSc and 1 PhD Student and was an Advisory Committee Members for several Master's and Doctoral students. He has published 40 scientific research papers in national and international journals, 35 popular articles, 40 articles in vernacular related to fisheries.

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Effect of the market structure on the European fish and seafood production industry profitabilityJose L. Fernandez Sanchez, Jose M. Fernandez Polanco, Ignacio Llorente Garcia, Elisa Baraibar Diez, Maria D. Odriozola Zamanillo and Ladislao Luna Sotorrio
IDES-UC, Spain

The purpose of this research is to analyze the effect that the market structure could have on the profit margins of the European (EU28) fish and seafood producers. This research employs the Structure–Conduct–Performance (SCP) paradigm to investigate the simultaneous relationship between price-cost margin (PCM), industrial concentration (IC), and technical efficiency (TE) in the European fish and seafood production industry. So, following Setiawan et al. (2013), the following non-recursive structural model can be formulated:

$$PCM = f(IC, TE, SIZE, GROWTH)$$

$$IC = g(PCM, GROWTH, CI)$$

$$TE = h(IC, SIZE)$$

This simultaneous system of equations has been estimated using the Full Information Maximum Likelihood (FIML) estimation method. Annual industry-macro data from different private and public sources (AMADEUS, STECF, and EUMOFA databases) for each of the EU28 countries during the period 2008–2013 has been employed to estimate the structural model parameters for the fishing and aquaculture sectors. The findings about our structural model are presented in Table 1. So, a good fit of the whole model was obtained and estimation results are majorly in agreement with economic theory. The results show that market growth is negatively related to market concentration whereas capital intensity and the price-cost margin are positively related with industry concentration. Also, it has been found that higher industrial concentration leads to lower technical efficiency. On the other hand, technical efficiency is affected positively by the sector size (significance at the 1% level). Further, technical efficiency affects price-cost margin positively since technical efficiency lowers the per unit cost of production. Finally, industry concentration, technical efficiency, and market growth affect positively industry price-cost margins (at least, in the case of fishing sector, this effect has been statistically very significant) whereas industry size had a negative effect on the fish and seafood producers' profit margins.

Biography

José L. Fernández Sánchez is economist and professor of business economics and organization in the department of business administration at University of Cantabria (UC) in Santander (Spain). He also participates in the UC's research group IDES. He gets a doctoral degree in Business Administration from University of Cantabria and two master degrees in Marketing (ESIC) and Economics (Queens College, CUNY). His research interests are related to corporate social responsibility, corporate reputation and strategy, as well as the sustainability of the primary sector and the food industry.

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Strengthening aquaculturist capacity via community organization

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¹Kasetsart University, Thailand

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Most of aquaculturists in Thailand operate as small scales and individual farms; therefore the development of aquacultures needs to be managed as community organizations to increase higher power of negotiation from the middlemen. Selected community organizations included Chacheongsao Province Sea Bass Aquaculturist Network Group as non-juristic organization, Tambon Tasoong Aquaculturist Group registered as juristic organization, two tilapia aquaculturist cooperatives including Pan Fisheries Cooperative, Ltd., and Nakornnayok Aquaculturist and Processor Cooperative, Ltd., and shrimp aquaculturist cooperatives in four watersheds i.e. Samroyyod-Pranburi, Tatong, Pak Phanang, and Chanthaburi. The purposes included: 1) The study of cost-return in aquaculture groups 2) Analysis on the factors of success of the community organization 3) Study factors of success and guidelines to strengthen aquaculturist capacity via community organization. Data were collected from deeply interviewing 30 group members and 10 leader communities and local government agencies in each organization. The research methods are cost-return, Context Input Process and Product (CIPP model), SWOT-TOWS analyses and member participation. The results show that the cost-return of fish aquaculture in Pan Fisheries Cooperatives and Sea Bass Aquaculturist Network Group can earn profit while Nakornnayok Aquaculturist and Processor Cooperative face loss. In the case of shrimp, three shrimp cooperatives in Tatong, Pak Phanang, and Chanthaburi can earn profit excluded Samroyyod-Pranburi. There were four internal factors of success in establishing community organization. The first two factors were resource persons including the members and the leaders. The third factor was organization office and running capital. The fourth factor was the community operation. There should as well be external support and opportunity for successful operation. Recommendations for community organization development included: 1) Member development to realize that collaboration was to strengthen their capacity. 2) The leaders must be honest and fair and available for organization work, as well as be acceptable among the members. 3) There should be office to conveniently serve the members especially funding. 4) The organization should offer full services to members including production promotion, provision of input supplies, information provision, and collaboration with relevant agencies.

Biography

Kulapa Kuldilok is a Lecturer at Department of Agricultural and Resource Economics, Faculty of Economics, Kasetsart University, Thailand. Her interests range from fisheries and aquaculture management as well as, agricultural production and marketing. Her previous research interest included strengthening aquaculturist capacity via community organization, capacity building for Thai fish farmers towards ASEAN Economic Community: Status and outlook, and study on efficiency of wholesale and retail markets of royal project's safe fruits, vegetable and coffee product and consumers demand on safe fruits, vegetable product and coffee.

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Sustainable shrimp farming in Biosecure RAS and Biofloc technology: Commercial experience and approaches to disease control

Nyan Taw

Senior Technical Advisor/General Manager, Blue Archipelago Berhad

Biosecure Biofloc technology applied in shrimp farming is adapted from the basic minimum water exchange shrimp intensive culture system used in Indonesia since early late 1990s. The system then was to position aerators within culture ponds to concentrate waste (sludge) into centre of ponds which were then siphon out physically or through central drain system. The aerators were operated almost 24 hours to have optimum culture pond environmental condition. The system creates clean water column and bottom feeding area and separated the sludge area. Shrimp biofloc system is somewhat an upgraded system by introducing carbon such as molasses and wheat flour to develop a heterotrophic environment with zero water exchange which suspend biofloc colony within pond water column. The biofloc system is developed by developing algae first and later cross over to biofloc to have self-nitrification process sets in (Taw 2014). Main economic benefits of shrimp biofloc system are – better biosecurity, low FCR, higher production, higher energy efficiency and sustainable production. Biofloc system alone cannot prevent ever emerging shrimp diseases. However, biofloc and biosecure shrimp farm design, construction and operation system have shown to prevent diseases entering the farm facilities (Taw 2005; Taw et al 2008, & Taw & Setio 2014). In Malaysia biosecure modular RAS system with biofloc technology has been applied at Blue Archipelago shrimp farm since October 2011 and has been operating successfully without any incident of EMS/AHPND which was a major threat to China, Vietnam, Malaysia and Thailand (Taw, et al. 2013 & Taw 2014). According to In-Kwon (2012 & 2014) there were more than 2,000 bacterial species in well-developed biofloc water. This biofloc may enhance immune activity based on mRNA expression of six immune-related genes – ProPO1, ProPO2, PPAAE, ran, mas and SP1. A study at Bogor University, Indonesia and Ghent University, Belgium revealed that biofloc system contributes to the enhancement of immune response and survival after IMNV challenge regardless the carbon source. The application of BFT brings about beneficial effect in disease control and management in shrimp culture.

Biography

Nyan Taw received his PhD from the University of Tasmania, Australia. He served as short term Consultant for FAO and World Bank funded projects in Saudi Arabia and Vietnam. He was a technical counter-part for ADB and JICA projects to develop the fisheries sector in Myanmar from 1976 to 1987. In 1988, he joined the FAO of the UN and served in Aquaculture projects in Indonesia, Vietnam and the Philippines culminating the position of CTA. From 1995, he served as Production Director at a number of locations in Indonesia. In 2002, he joined CP Indonesia, as VP where he initiated Biofloc Technology. Later he served as SVP for Dipasena Group, Indonesia. He served Blue Archipelago as GM and developed a biosecure, modular RAS system shrimp farm from 2009 to 2015 in Malaysia. He has provided consultancy for shrimp farming companies in South & Central America, Middle East and Asia. He conducted Shrimp Biofloc Technology workshops for shrimp farmers in Malaysia, Australia, India, Saudi Arabia, Indonesia, Thailand & Myanmar. He co-authored a chapter in the book by Avnimelech on Biofloc Technology (2012 & 14).

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Possibility of marine eukaryote, thraustochytrids as novel probiotic candidates in aquaculture

Yousuke Taoka

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World aquaculture production has continued to increase. Fishmeal is used as protein sources for aqua-feeds. However, the price is drastically increased to around 170,000/ ton in 2013 during recent 10 years because of the decrease of fish resources, anchovy. This is serious problem for sustainable aquaculture. Therefore replacement of fishmeal to another resource is urgently needed. Several researchers reported the replacement of protein sources from fishmeal to plants. However, the complete replacement by plant proteins is not established yet because plant sources contained some components that negatively affect the growth of the cultured fish due to the low digestibility. We focused on the “thraustochytrids” as probiotics to enhance the digestibility of plant sources. Thraustochytrids are widely distributed in marine environment and have unique characteristics that accumulate large amount of lipids in cell bodies. Additionally, it is known that thraustochytrids produce various extracellular enzymes including refractory components such as cellulose. In this study, we researched the profile of extracellular enzymes from thraustochytrids and the tolerant ability in the gastrointestinal juices *in vitro* and *in vivo* to evaluate the potency as probiotics. Production of various extracellular enzymes, protease, amylase, lipase (tween 80 hydrolytic enzyme), cellulase and tannase were detected depending on the genus or species of thraustochytrids. The tolerance to artificial gastric juices was high in genus *Aurantiochytrium* and *Ulkenia*, and low in genus *Oblongichytrium*. In the case of *in vivo* test, *Aurantiochytrium* was recovered from the intestine of Japanese short-necked clam, *Ruditapes philippinarum* (“Asari” in Japanese). Additionally, we have isolated more than one hundred thraustochytrids from marine environment and are screening probiotic abilities to select adequate strain now. As next step, we are planning the rearing trial with aquaculture-major fish species and supply live thrautochytrids by oral administration.

Biography

Yousuke Taoka has completed his PhD from the United Graduate School of Agricultural Sciences, Kagoshima University and Post-doctoral studies from University of Miyazaki. He worked in a commercial fisheries company, Nippon Suisan Kaisha, Ltd. as a Researcher and joined University of Miyazaki in 2011. Recently, he has focused on the production of functional substances from marine microbes and the utilization in the field of aquaculture.

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The European Fish and Seafood Value Chain: Analysis of the period 2009-2013

Ladislao Luna Sotorrio, Jose L. Fernandez Sanchez, Jose M. Fernandez Polanco, Ignacio Llorente Garcia, Elisa Baraibar Diez and Maria D. Odriozola Zamanillo
IDES-UC, Spain

The objective of this study is to show how the revenues, costs, and profits of different agents are distributed over the entire fish and seafood value chain (VC) in Europe. A typical fish and seafood value chain consists of harvesting (either through fishing or aquaculture, or a combination of both), processing, distribution and marketing and finally consumption. To perform this analysis, we employ the VC methodology, which attempts to understand value creation, activities of actors and their financial performance along the chain (Deng et al., 2016). We have employed fish and seafood prices obtained from EUMOFA and economic data of EU28 firms obtained from the AMADEUS (total) database for the period 2009-2013. Regarding the figure, the average retail prices of fish and seafood products grew in Europe a 19.1% in 5 years, whereas production prices increased by a 2.2%. According to the figures in the table, some European countries with a high participation of producers in the VC as Italy, Sweden, Portugal, France, and Greece with percentage values in a range of 40%-80% of the retail price. Other countries, however, have a low participation, below 30%, of producers in the VC as Netherlands, United Kingdom, Germany, Lithuania, and Latvia. Producers' VC participation is positively correlated with production prices, but it is not correlated with retail prices. So, we can infer that in some countries some agents in the VC can moderate their own prices to compensate high producers' prices.

Biography

Ladislao Luna Sotorrio is economist and professor of business economics and organization in the department of business administration at University of Cantabria (UC) in Santander (Spain). He gets a doctoral degree in Business Administration from University of Oviedo and leads the UC's research group IDES. His research interests are related to corporate social responsibility, corporate reputation and strategy, as well as the sustainability of the primary sector and the food industry.

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Breeding biology of *Priacanthus hamrur* (Forsskal) off Mangalore Coast, Karnataka, India

Anjanayappa H N, Benakappa S, Ramachandra Naik A T, Rajanna K B, Nayana P and Rajesh D P
College of Fisheries, Mangalore, India

Fishes of the family *Priacanthidae* are popularly called as big eye or bull's eye. *Priacanthus hamrur* is an important deep-water inhabitant of great commercial value. High percentage of landings of *Priacanthidae* was used as raw material for surimi, sausage and other fishery by-products. Presently, it has great demand in Singapore, Thailand, Taiwan, Hong Kong and other countries. For the maturation studies, samples were collected from commercial landing centre, Mangalore. Studies on reproductive biology showed that *Priacanthus hamrur* spawns twice in a year, the spawning season extending from March to May and October to November. Based on the percentage occurrence of mature fishes in various size groups, it was inferred that male attained maturity at smaller size than female. This study will enable us to understand the spawning periodicity, cyclic morphological changes in male, female gonads and also it helps to improve stock size by enforcing fishing ban in particular season by assessing spawning periodicity.

Biography

Anjanayappa H N is a Professor and Head of the Department of Fisheries Resources and Management, College of Fisheries, Mangalore, Karnataka, India. He has 22 years of experience in teaching, research and extension in the field of Fisheries Resources and Management. His role involves principally teaching the Undergraduate (BFSc) and Postgraduate (MFSc and PhD) students, in Fisheries Resources and Management courses covering fish population dynamics and stock assessment, taxonomy of finfish and shellfish, biodiversity of finfish and shellfish, marine fishery resources, anatomy, physiology of finfish and shellfish, biology of fish, tropical fish stock assessment, Applications of fisheries models in stock assessment and Modern techniques in ichthyotaxonomy. Besides, his role also includes research work of applied nature related to fisheries resources, their abundance, distribution, assessment and management. In addition, an effective extension work in fisheries is undertaken as a tool of taking the message from lab to land. Popular articles, interviews through local electronic media, etc., are also undertaken for the benefit of fisherfolk.

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Growth performance and biochemical composition of *Labeo rohita* to feed containing *Nerita* species

Nchumbeni Humtsoe and B G Kulkarni
Department of Fisheries, Nagaland, India

A six month's feeding experiment was conducted to evaluate the incorporation of five feed ingredients with the flesh of *Nerita* species in the diet of *Labeo rohita*. Fingerlings of *Labeo rohita* weighing 2-4 gm were divided into six groups and fed with prepared feeds using five different feed ingredients such as ground nut oil cake, tapioca flour, and rice bran and wheat flour along with different levels of the flesh of *Nerita* species as experimental diets. A control group of rohu fingerlings was maintained on pelleted feed without adding the flesh of *Nerita* species. Fishes were fed twice daily with the respective test diets at the rate of 4% body weight during entire culture period of three months. Results regarding growth performance of *L. rohita* fingerlings fed on different experimental diets showed that the best growth performance of fish in terms of percentage live weight gain was noted as 131.68% where as 46.60% was noted with control diet which is prepared without adding the flesh of *Nerita* species. Maximum increase in length (2.90 cm) was noticed in the fingerlings fed with highest level of the flesh of *Nerita* species compared to minimum increase in length (1.33 cm). Specific Growth Rate (SGR) per day of fish fed on different experimental diets was noted in the range of 0.22-0.61% compared to control diet which was noted as 0.28%. The feed conversion ratio observed 4.417 was highest in fish fed with highest level of the flesh of *Nerita* species compared to fish fed on control diet which is noted as 4.032. This study reveals that incorporation of the flesh of *Nerita* species in different feed ingredients is one of the best animal proteins in terms of growth and feed conversion which is optimum for growth of *Labeo rohita*.

Biography

Nchumbeni Humtsoe obtained her PhD degree from University of Mumbai, India on the topic "Growth performance and biochemical composition of *Labeo rohita* to feed containing *Katylisia opima* and *Nerita* species," and completed a course on "Professional planning and development programme in fisheries" from CIFE, Kolkata, India. She had represented Scientist Team from India and attended 7th Indo-Pacific Fish Conference at Taiwan and presented a paper on topic, "Effect of arsenic on the enzymes of freshwater fish *Labeo Rohita*" which was published in reputed international journal. She had presented research papers on several national conferences. She is a competent Researcher and can work well in team with good communication skills and tackle any challenges positively. She is specialized in Fish Nutrition and Feeding Technologies. She is a Life Member of Indian Fisheries Association since 2008 and currently working as a Fishery Inspector in the Department of Fisheries, Government of Nagaland, and India.

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Mr-Masc gene for sex-regulation and production of all-male populations in the giant freshwater prawn *Macrobrachium rosenbergii***Wen-ming Ma, Dong-rui Li, MS and Wei-jun Yang**
Zhejiang Wanli University, China

Statement of the Background: *Macrobrachium rosenbergii* is one of the most important prawns in freshwater aquaculture. Male giant freshwater prawns grow faster and reach higher weights at harvest than females, which make the culture of all-male populations desirable. The purpose of this study is to explore the molecular information of new gene and its potential physiological function on sex regulation. Methodology & Theoretical Orientation: The gene expression pattern was studied using Real-time RT-PCR. The functional role of gene in vivo by RNA interference (RNAi) was utilized and its effect on sex regulation was evaluated. Findings: In this study, a novel gene of the full-length cDNA encoding a masculinizing factor from the giant freshwater prawn *Macrobrachium rosenbergii* was termed Mr-Masc. Real-time RT-PCR analysis revealed that Mr-Masc gene expression was obviously difference between male and female prawn, and dominantly expressed in the ovary of the reproductive tract in female prawn. To elucidate the functional role of Mr-Masc in vivo, the Mr-Masc gene was disrupted by RNA interference (RNAi). In vivo silencing of the gene, by injecting the all-male and monosex postlarvae with Mr-Masc double-stranded RNA, sex-reversed females (neofemales) were obtained. Moreover, all-male progeny was produced by mating neofemales with normal males and these all-male populations showed good growth potential and market value in the aquaculture. Conclusion & Significance: It was firstly reported the full and functional sex reversal of male freshwater prawns through the silencing of a single Mr-Masc encoding gene. Neofemales capable of mating and spawning were produced by the RNAi technology at a sufficiently early stage of larval development. This finding offered an insight regarding the biology and evolution of sex differentiation regulation. Since sexual dimorphic growth patterns are common among decapod crustaceans, it is obvious that the results of this study will have applied significance for many aqua cultured species.

Biography

Wen-ming Ma has expertise in sex determination and sex differentiation of the marine shrimp and prawn, functional gene discovery and application research. Meanwhile, make a good progress in sex control and all-male unisexual cultivation in *Macrobrachium rosenbergii*.

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Study on the Treatment of Soft Tunic Syndrome in Korean Sea Squirt Using Probiotics

Hyungki Do

Jin-Hwan Kwak, South Korea

Sea squirt is a major source of income for the south coast and east coast in Korea. However, since the damage caused by soft tunic syndrome (STS) is increasing, it is necessary to develop a new fundamental method for the treatment of STS. The STS is mainly observed during March through June when the water temperature is relatively low. But it hardly occurs during summer when the water temperature exceeds 20 °C and during winter when the water temperature is very low. At present, *Azumiobodo hoyamushi* is considered to be the main cause of the STS. Since there is no fundamental cure yet, the damage to STS is expected to increase in the future. Therefore, it is urgent to study the pathogenesis of STS through systematic and practical research, and to develop a therapeutic method by increasing immunological activity to prevent disease. We have concluded that the cause of STS in Korea is the result of *A. hoyamushi* infection. Experimental conditions for infection model caused by *A. hoyamushi* were investigated, and the preventive effect of new probiotics developed in our lab was verified in this infectious disease model. Studies are also under way to see how the *A. hoyamushi* destroy the membranous fibers of the sea squirt and overwhelm the innate immune system of it.

Biography

Hyung Ki Do is a native of South Korea and has international experience includes various programs, contributions and participation in different countries for diverse fields of study. His research interests reflect in his wide range of publications in various national and international journals.

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Purification, optimization and physicochemical properties of collagen from soft-shelled turtle calipash

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Zhejiang Wanli University, China

The present work was to optimize the purification conditions for soft-shelled turtle (*Pelodiscus sinensis*) calipash collagen (STCC) isolated by pepsin and to explore collagen physicochemical properties for potential biomaterial applications. Single-factor test and orthogonal method L₉ (3⁴) were employed with the STCC recovery yield as indicator. The optimum purification conditions were obtained when NaCl concentration, collagen concentration and purification time were 2 M, 8 g/L, and 24 h, respectively. Purified STCC were characterized by SDS-PAGE, UV scanning, FTIR, solubility, thermal behavior and amino acid analysis. The results showed that STCC contained high hydroxyproline content than that of other fishery skins, belonging to typical type I collagen in form of [α1(I)]₂α2(I). FTIR spectra of STCC were quite similar to other aquatic animals' collagens. It has the lowest solubility at pH 6, and when NaCl concentration decreased from 2% to 6% (w/v), solubility dropped. The denaturation temperature (T_d) and melting temperature (T_m) were 35.1°C and 105.14°C, respectively. Morphology of STCC depicted as regular and porous network structure by SEM. In general, the results suggested that turtle calipash can be exploited as alternatives to mammalian collagen and could also be used for biomedical applications as a potential new material.

Biography

Research interest is to investigate the functional active substance and nutritional quality formation in aquatic animals, with emphasis on protein/bioactive peptide preparation in Chinese soft-shelled turtles.

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Special Session (Day 2)



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Len S Smith

Heliae, USA

Potential aquaculture applications for novel DHA-rich microalgae

Omega-3 fatty acids, such as DHA and EPA, have been demonstrated to have critical roles in both fish and human nutrition. Increasingly, fish products are sourced from farmed fish. However, many farmed fish have been demonstrated to lack the omega-3 fatty acid content of typical wild fish counterparts. Moreover, in a period where consumers increasingly wish to obtain healthy dietary components, such as DHA, from fish, as compared to from dietary supplements, the amount of DHA in fish has reportedly fallen. Most omega-3 sources used in feed today are not efficient at achieving optimal DHA:EPA ratios as microalgal sources, as these traditionally used sources usually have relatively high amounts of EPA to DHA. DHA-rich microalgae can provide an alternative tool for feed formulation, one that allows feed formulators a way to supply precise amounts of DHA into the feed. In addition, the DHA in microalgae is naturally encapsulated, providing a more stable source of DHA. Heliae has sourced novel DHA-rich microalgae and developed a production technology that will allow this product to be widely available to the aquaculture industry.

Biography

Len S Smith holds the position as Chief Business Officer of Heliae. Heliae is an applied microalgae research, development, products and technology provider based in Arizona, USA. He has been associated with Heliae since 2014. Prior to his current role at Heliae, he held management and leadership positions with leading biotechnology and pharmaceutical companies in the USA. He holds degrees in Biology, Environmental Science, and Business from leading US universities.

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Asian Fisheries Management | Fish Biology Immunology, Physiology & Pathology | Freshwater & Marine Fisheries/Aquaculture | Culture of Fishes, Crustaceans, Molluscs & Aquatic Plants | Fisheries Management & Policy

Session Chair

Sadiqul Awal

Melbourne Polytechnic, Victoria Australia

Session Introduction

Title: Reclamation of salt affected soils and production of microalgae biomass for commercial purposes

Sadiqul Awal, Melbourne Polytechnic, Victoria Australia

Title: Economic assessment and policy recommendations of fisheries development strategies in Vanuatu

Rowena Valmonte-Santos, International Food Policy Research Institute (IFPRI), USA

Title: The mechanism study of migration, transformation and selective removal of pyrethroid residues in aquaculture ecosystem

Xizhi Shi, Ningbo University, China

Title: Regulation of melanin synthesis by key genes involved in melanogenesis pathway in *Pelodiscus sinensis*

Qian Wang, Zhejiang Wanli University, Ningbo, China

Title: Current Status of Bivalve Farming in Sri Lanka

W.M.T.B. Wanninayake, Wayamba University of Sri Lanka

Title: Impact of salinity on Shrimp-prawn farming, household food consumption and nutritional outcomes of adolescent girls at different agro-ecological landscape in Bangladesh

Abdullah-Al Mamun, Noakhali Science and Technology University, Bangladesh

Title: The isolated and combined influences of ammonia and nitrite on phenol oxidase system of white shrimp (*Litopenaeus vannamei*)

Cheng-Hao Tang, National Sun-Yat sen University, Taiwan

6th Global Summit on

AQUACULTURE AND FISHERIES 2017

May 25-26, 2017 Osaka, Japan

Reclamation of salt affected soils and production of microalgae biomass for commercial purposes

Sadiqul Awal

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The issue of the salinization of Australia's inland ground water is a recurring and major environmental problem that is often the result of previous uses of the land for agricultural purposes and the use of certain irrigation practices. Inundation of land by saline water for long periods leads to its percolation into the surrounding soils, resulting in altered soil chemistry. Prolonged inundation inhibits the fixation of free nitrogen and halts mineralization, thus impairing soil fertility within a few years. The elevation of a water table that features increased salinity levels (sometimes approaching or even exceeding that of seawater) means that while the environmental ramifications are potentially massive (and include crop damage), it is also true that such waters are an untapped and largely unexplored aquatic resource. It is true that such inland areas present a wonderful opportunity to farm a variety of fish, molluscs and crustaceans (an opportunity that has thus far been realised on a relatively very small scale), but there is no doubt considerable scope to grow microalgae, which underpin the bottom of the food chain in aquatic systems and have an enormous number of potential uses. Microalgae are potentially ideal candidates for remediation of these salt affected soil and lands. Microalgae can be deployed for bioremediation at sites with highly variable salinities, without significant effects on end-product potential.

Biography

Sadiqul Awal has completed his PhD from Deakin University, Victoria, Australia. He is currently working as a Lecturer at Melbourne Polytechnic, Victoria, Australia. He has published more than 20 papers in reputed journals and has been serving as Reviewer in many journals. His research interest is in aquaculture in inland ground saline water, microalgae, and estuarine environmental management.

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Economic assessment and policy recommendations of fisheries development strategies in Vanuatu

Rowena Valmonte-Santos and Mark W Rosegrant

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Statement of the Problem: Small-scale fishers are negatively affected by climate change in Vanuatu. Livelihoods and health of coastal communities that heavily rely on farming and fishing for subsistence and incomes face serious risks. Aquaculture, marine protected areas through natural resource management (NRM), and low-cost inshore fish aggregating device (FAD) can improve the economic conditions of coastal communities in Vanuatu. The purpose of this study is to assess the fisheries development strategies in Vanuatu, determine any economic benefits, and provide some policy recommendations for consideration by the national government.

Methodology: A fish market supply–demand model was applied that assesses the impact of climate change supply shocks and policy responses on fish supply and demand and economic welfare. Data was collected through literature and focus group discussions. Results were presented and validated by different national agencies.

Findings: Baseline results indicate that aggregate fish consumption is expected to increase considerably in 2035 and 2050. Oceanic fish production is projected to increase, hence Vanuatu will remain a net exporter by 2050 but coastal production will decline in 2010-2050. Coastal fish will most likely be imported to augment rising demand from population and income growth. Combined low-cost FAD and NRM are projected to increase net exports and consumption of coastal fish. Coastal finfish and tuna contribute about 77% of current consumption, thus combined low-cost FAD and NRM will have positive impacts on poorer households. Estimated national level annual economic gains ranged from US\$4.5 million for aquaculture to US\$35 million for NRM+FAD (in 2009 US\$ constant price) in 2050 in Vanuatu.

Conclusion & Significance: The present government initiatives and level of investments are not sufficient to achieve significant impacts to minimize, if not reverse, the deteriorating fish productivity in Vanuatu. Expansions of aquaculture, NRM, and FAD can cost-effectively improve sectoral performance, promoting food security.

Biography

Rowena Valmonte-Santos has over 30 years of experience in natural resource management research with emphasis on food security in developing countries, participatory approaches to community based fisheries management, and threats and opportunities of climate change in agriculture and fisheries sectors in Asia and Pacific. She conducted trainings on common tools used for surveys in social science research and water quality assessment in Asia and Pacific. She received over 10 awards including Distinguished Alumna Award for International Research and Development on Environmental and Natural Resource Management awarded by the School of Environmental Science and Management, University of the Philippines Los Baños; Best Published Paper in Marine Fisheries Category (co-author) awarded by Dr. Elvira O Tan Memorial Awards, National Academy of Science and Technology (NAST) Convention; and Outstanding Published Paper (co-author) awarded by NAST. She has authored or co-authored over 20 referred journal articles, a book, five book chapters, and over 40 technical reports.

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The mechanism study of migration, transformation and selective removal of Pyrethroid residues in aquaculture ecosystem

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Statement of the Problem: Pyrethroids are usually applied to control insects and weeds in agriculture and fishery. The serious influence of these compounds on the aquaculture and breeding usually occurs at low residue level because of their endocrine-disrupting properties. Therefore, determining the pollution condition and removal of pyrethroids with endocrine-disrupting properties in aquaculture ecosystem is important to protect the aquaculture ecosystem and eliminate the hazards of pyrethroids to aquaculture and breeding. Methodology & Theoretical Orientation: In this study, the pollution condition, migration, and transformation of pyrethroids were elucidated by simulating a natural tidal flat ecology. Furthermore, the novel molecularly imprinted nanostructured polymers (MIPs) were fabricated by surface grafting technique and used as carrier of pyrethroid-degrading bacteria. Findings: The novel MIPs were developed and successfully used as carrier of pyrethroid-degrading bacteria, which can improve the degrading efficiency of specific trace pyrethroid. Furthermore, the degradation efficiency was investigated according to the migration and transformation characteristics of pyrethroid influenced by the immobilized bacteria onto the fabricated MIPs. Conclusion & Significance: The results obtained in this study could provide the theoretical and technological support to eliminate the hazards of pyrethroids with endocrine-disrupting compounds in aquaculture ecosystem and aquatic products.

Biography

Shi Xizhi developed the extraction technique based on the molecularly imprinted polymer and molecularly imprinted membrane with high selectivity to pyrethroids with endocrine-disrupting properties, and obtained reliable analytical method based on GC-MS/MS for multi-residue determination of them in aquatic products and aquaculture environment. Meanwhile, the impact of their residues on the aquatic biology and environment is likely to become more apparent. Therefore, they isolated the degradation bacteria, and developed immobilization technique based on molecularly imprinted polymer, which successfully applied to the bioremediation of trace pyrethroids residue in aquaculture environments.

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Regulation of melanin synthesis by key genes involved in melanogenesis pathway in *Pelodiscus sinensis*

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This work was carried out to investigate the mechanism of melanin synthesis in Chinese soft-shelled turtle, *Pelodiscus sinensis*. About 1500 eggs of Chinese soft-shelled turtle were collected from Dafan turtle breeding aqua farm in Shaoxing, Zhejiang province, China. Samples were well stored in a 31°C incubator with 85% humidity until use. To overexpress target genes, lentivirus (LV) vector harbouring microphthalmia-associated transcription factor (MITF) or tyrosinase (TYR) were injected into embryos of stage 15, respectively. Two weeks later, embryos and tissues were sampled for further study. Embryo morphology, melanin pigmentation, as well as gene expression pattern were determined. As a result, we found that both MITF and TYR showed negligible expression before stage 16 in wild type *P. sinensis*, but increased rapidly after stage 18 and increased continuously along with the embryo development. Determination of tissue distribution of these two genes revealed that both MITF and TYR highly expressed in carapace, limbs and eyes, suggesting high melanin accumulation in these tissues in adult turtles. Compared with that of wild type, haematoxylin-eosin (HE) staining of carapace showed that transient overexpression of MITF or TYR probably increased melanin pigmentation in Chinese soft-shelled turtles. Thus, it is speculated that both MITF and TYR play key roles in melanogenesis in *P. sinensis* and further work is required to unravel the mechanism.

Biography

Qian Wang got his PhD degree in Zhejiang University (China) in 2012, majored in animal nutrition and feed science. He has been working on protein engineering of feed enzymes to improve catalytic activities and properties by using site-directed mutation and directed evolution. After that, he joined Temasek Lifesciences Laboratory (Singapore) and worked as post-doctoral fellow. His work mainly focused on metabolic engineering of secondary metabolites especially terpene biosynthesis in plants. In 2015, he joined Zhejiang Wanli University, and worked in melanin synthesis in Chinese soft-shell turtle.

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Current status of bivalve farming in Sri Lanka

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Bivalve Molluscs such as oysters, mussels, scallops, clams and cockles comprise a significant part of the world's fisheries production. According to the statistics of the Food and Agriculture Organization (FAO), over 14 million metric tons of bivalves are produced annually through aquaculture. China, Japan, South Korea, Vietnam and Thailand are the pioneers in the market. During the decade from 2000 to 2010, a rapid increase was seen in the production of bivalves and landing doubled from 7 million MT in 2000 to more than 14 million MT in 2010. During this period bivalves landing from the wild increased slightly from 2.5-3.5 million MT while cultured bivalves doubled during the same period increasing from 6.3 -14 million MT comprising nearly 75% of the world bivalve production. Sri Lanka is a South Asian Tropical Island in the Indian Ocean. It has total land area of 65610 km² with a population of 22 million, coastal line of the island about 1340 Km with 158,000 ha of brackish water areas (lagoon and estuaries). The country is very rich in economically important bivalves such as oysters (*Crassostrea madrasensis*, *Saccostrea cucullata*) mussels (*Perna viridis*, *P perna*), clams (*Marcia opima*, *M. hiantina*, *Meretrix casta*) cockles (*Gafrarium tumidum*, *Anadara granosa*) and pearl oysters (*Pinctada vulgaris*, *P. margaritifera*) around the coastal areas. Fishermen harvest bivalves from natural habitats in Negombo, Chilaw, Kalpitiya, Mannar, Jaffna, Trincomalee and Southern coastal belt of the country. Though bivalve farming is not commonly practiced in the country, a very high potential is available in the above specified areas. However, with the booming of the tourism industry in coastal areas of Sri Lanka, an attractive marketing atmosphere in other countries, the community based bivalve farming has started in many parts of the country through government initiation. Bottom, rack, stake and raft culture systems are used for the farming of oysters, mussels and clams in these areas. Naturally available untapped bivalves, unpolluted marine water, cheaply available culture materials, low cost labour availability of technology and government support are also encouraging factors for investment in bivalve farming in Sri Lanka.

Biography

W M T B Wanninayake (Senior Marine Biologist) formerly served as Professor of Fisheries and Aquaculture, Wayamba University of Sri Lanka and Chairman, Ocean University of Sri Lanka. He is a former Senior Researcher of the National Aquatic Resources Research and Development Agency (NARA), Colombo. He earned his BSc in Zoology and MPhil in Aquaculture (Crustacean Research) from the University of Kalaniya, Sri Lanka and PhD in Bivalve Research from the University of Liverpool, United Kingdom. He contributed immensely in developing the prawn farming industry and hatchery sector in Sri Lanka. He has been recognized for introducing oysters, mussels, clams and cockles farming in Sri Lanka and is also a pioneer in introducing pearl culture in freshwater reservoirs. He is a Founder Member of the Asian Fisheries Forum (AFS) and Sri Lanka Association for Fisheries and Aquatic Resources (SLAFAR). He has wide experience and a profound understanding of aquaculture and aquatic environment in many European and Asian countries. Currently, he serves in advisory capacity to few ministries related to his work in Sri Lanka.

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Impact of salinity on shrimp-prawn farming, household food consumption and nutritional outcomes of adolescent girls at different agro-ecological landscape in BangladeshAbdullah-Al Mamun¹, David C Little², Matthew Spargue² and Francis J Murray²¹Noakhali Science and Technology University, Bangladesh²University of Stirling, UK

Statement of the Problem: Aquaculture is well established for ensuring food security, economic development, improved nutrition and poverty alleviation. But the shrimp and prawn farming issues due to socio-economic and environmental degradation require further consideration. However, very little effort has been given to provide a holistic scenario of shrimp-prawn farming and its direct and indirect impacts on food and nutrition security in LIDCs including Bangladesh. This multi-disciplinary work was aimed at identifying the existing farming systems at different agro-ecological landscapes in the south-west coastal seafood farming area in Bangladesh and its impact on community food security.

Methodology & Theoretical Orientation: On the basis of surface water salinity level, the shrimp-prawn farming areas were divided into four different agro-ecological zones: (high saline (HS)>10 ppt, medium saline (MS)<10>5, low saline (LS)<5 ppt; freshwater (FW) area 0 ppt). In depth survey both in farm and household level were executed. Social well-being categories (better-off and worse-off) were practiced according to Haque (2007). The criterion for selection of households was having at least one unmarried adolescent girl (10-18 years old). 24 hrs foods recall method and food frequency questionnaire were developed and administrated with two replications and the anthropometric data height, weight, age, sex, MUAC were collected to address the preparedness for critical 1000 days issues. Blood samples from finger tips were collected and dried on a sample pad to identify the n-3 fatty acid level being one of the vital biomarkers to address the adolescent health outcomes that are mostly related to seafood consumption.

Findings: About 57 different species were commonly available and tiger shrimp, speckled shrimp, mud crab, freshwater prawn are the main export commodities that varied from 20-48% in terms of volume and with the rest being consumed locally and regionally. Rice and about 22 varieties of dyke vegetables are available and main items are gourd, cucumber, etc. In terms of volume, 20% fish, 60-80% rice and 5-10% vegetables were consumed at household level and the rest of them are destined for local, regional and international markets. Regarding the intra-household allocation of fish consumption of adolescent girls these ranged from 80-148 g/day while the household head father consumed 123-205 g/day. The BMI and MUAC values of the adolescent girls were in the acceptable range. The n-3 long chain PUFA in the whole blood samples of adolescent girls were gradually decreased from higher saline to lower saline areas however there was no significant differences between better off and worse-off segment in the same agro-ecology. The omega-3 index in higher saline areas was in intermediate stage however adolescent girls in the lower saline areas were in undesirable stage (Fig 1). The n-3 long chain PUFA ratio total PUFA (Land 2003) also followed the same trend across the agro-ecologies. These findings are quite different as most previous assertions are based on poorly generalizable 'worst case' scenarios. This paper attempted to consider the aquatic and terrestrial diversity and its impacts on household consumption and nutritional outcomes of vulnerable adolescent girls.

Biography

Abdullah-Al Mamun is a Research Scholar from University of Stirling, United Kingdom He has graduated from Bangladesh Agricultural University, Bangladesh, with an immediate post-graduation in Victoria Government College, Comilla. As a Research Scholar, he is a recipient of many awards and grants for his valuable contributions and discoveries in major area of research. His research interests, as a Research Scholar lie in Fish Nutrition his area of expertise, as a Research Scholar credited him with many publications in national and international journals. He is committed to highest standards of excellence and it proves through his co-authorship.

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The isolated and combined influences of ammonia and nitrite on phenoloxidase system of white shrimp (*Litopenaeus vannamei*)

Cheng-Hao Tang

National Sun-Yat Sen University, Taiwan

Aquatic animals would naturally or anthropogenically face environmental stress leading to many physiological disturbances, including interference in immune response. The shrimp *Litopenaeus vannamei* is an economically important species worldwide. Intensive farming with recirculating system is the common aquaculture practices nowadays that easily result in elevation of the levels of nitrogenous wastes, especially ammonia and nitrite. Since diseases outbreak would cause serious economic loss in aquaculture industry, the immunity of aquaculture species is the main research sector. This study aimed to investigate the potential threat of isolated and combined exposure to ammonia and nitrite to innate immunity of white shrimp through study on transcriptional and enzymatic responses of phenoloxidase (PO) system in hemocytes. The results revealed that not only the expression levels of pro-activating system related genes, *proPO1*, *proPO2*, proPO activating enzyme 1 (PPAE1), PPAE2, prophenoloxidase-activating factor (PPAF) and serine proteinase (SP) in hemolytic but also PO activity in plasma and hemocytes were significantly decreased in white shrimp exposed to isolated and combined stress of ammonia and nitrite. These findings suggested that rising waterborne ammonia and nitrite individually or simultaneously may cause disruption of the molecular and enzymatic responses of PO system. However, combined treatment was presumed to cause greater hemocytes injury which resulted in reduction of total hemocyte count since hemolymph ammonia and nitrite levels raised concurrently. Accordingly, elevated ambient nitrogenous wastes influenced the PO system which may make white shrimp more susceptible to pathogen infection. This study provided useful information for further field monitoring studies and may be helpful in identifying the impact of these stressors before severely harmful effects occur.

Biography

He is an Associate Professor for National Sun Yat Sun University. As an Associate Professor, he is a recipient of many awards and grants for his valuable contributions and discoveries in major area of research. His research interests, as an Associate Professor lie in Aquaculture Physiology, especially Molecular Stress Responses he is credited with many publications in national and international journals. He is committed to highest standards of excellence and it proves through his authorship of many books.

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Young Research Forum (Day 2)



Session Chair

Sadiqul Awal

Melbourne Polytechnic, Victoria Australia

Session Introduction

Title: Fish behavior characterization research in aquaculture pond with mechanically scanned imaging sonar

Chih-yung Shen, NSYSU, Taiwan

Title: Cross-reactivity and epitope analysis of anti-ginbuna CD4-1 and CD8 α monoclonal antibodies with lymphocytes of selected cyprinid species

Ryuichiro Miyazawa, Nihon University, Japan

Title: Effects of dietary phospholipids extracted from snails (*Buccinum striatissimum*) on the growth performance, stress resistance, immune response, and fatty acid composition of juvenile kuruma shrimps, *Marsupenaeus japonicus* (Bate)

Amina S. Moss, Kagoshima University, Japan

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Fish behavior characterization research in aquaculture pond with mechanically scanned imaging sonar

Chih-yung Shen^{1,2} and Wen-Miin Tian²¹CNA, Taiwan²National Sun Yat-sen University, Taiwan

For a comprehensive management of fishery aquaculture, knowledge regarding fish size, quantity and behavior in the pond or cage are important controlling parameters. However, due to the constraint of underwater environment, underwater information is hard to collect and controlling parameters for aquaculture management are basically measured or estimated through indirectly procedures. Underwater acoustic systems are standard tools for monitoring fish and other mobile objects in marine and freshwater environments. Among them, the mechanically scanned imaging sonar systems with bottom-fixed, side-looking working configuration can collect high resolution underwater imagery and were employed for the quantification of fish length, fish position, fish swimming speed as well as fish behavior pattern. The current research was conducted at a milk fish pond (85*52*2 m in dimensions, with 10,800 milk fish of 40~42 cm in length) in Mituo, Kaohsiung city, Taiwan, with emphasis in the quantification of fish length and fish behavior. The pond bank can be covered or depicted by the sonogram with slant range at 40 m. Acoustic imagery with slant range setting at 5 m was selected and used for the measurement of the acoustic fish length. The echo with spindle shape, relative strong intensity was identified to be a fish target. Target images that parallel to the scanning direction were selected for the evaluation of the fish true length. The conclusion of the calculated fish length, based on 116 measurements and a statistical estimation procedure, was 45.4 cm, which is close to the initially estimated fish length (40~42 cm). As fish behavior concerned, it was evident that fish swam counter-clockwise more frequently than swam clockwise in the acoustical scanning area and revealed the preferred swimming route or behavior of the fish in this specific monitoring time and area.

Biography

Chih-Yung Shen has his expertise in underwater targets detection, and behavior analysis by using acoustic, noninvasive method. He is an Instructor in Chinese Naval Academy, Kaohsiung, Taiwan and taught physics, investigated method and technology, and astronomy. He is also a PhD candidate majoring in Department of Marine Environment and Engineering in National Sun Yet-Sen University, Kaohsiung, Taiwan. The foundation is a methodology that detected, identified, located fish and analyzed the fish behavior pattern by using mechanical scanned sonar system. This approach is responsive to underwater targets detection methods which cannot be done before.

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Cross-reactivity and epitope analysis of anti-ginbuna CD4-1 and CD8 α monoclonal antibodies with lymphocytes of selected cyprinid species

Miyazawa Ryuichiro, Navaneethaiyer Umasuthan, Matsuura Yuta, Nakanishi Teruyuki

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Statement of the problem: The two major subsets of T lymphocytes, helper and cytotoxic T cells, are defined by expression of CD4 or CD8 glycoproteins, respectively. Activation of CD4 T cells leads to their proliferation and differentiation into effector or regulatory cells that mediate or control the immunity; whereas, CD8 T cells destroy virus-infected cells as cytotoxic T cells. Both are essential for protecting the host from pathogens. Therefore, it is important to understand the function of CD4 and CD8 T cells. However, analysis of fish immune mechanisms has been hampered by the lack of suitable tools such as monoclonal antibodies (mAbs) against CD4⁺ and CD8⁺ T cells.

Methodology & Theoretical Orientation: We have generated mAbs against CD4-1 and CD8 α in ginbuna crucian carp. In this study, we analyzed the cross-reactivity of these antibodies against the lymphocytes from eleven cyprinid species by flow cytometry. According to the reactivity of antibodies, we categorized them into high, medium- and low-reactivity groups. Additionally, we cloned the ORFs of CD4 and CD8 and analyzed their protein sequences from each fish.

Findings: We identified those lymphocytes from four fish species cross-reacted with ginbuna CD4-1 mAb and lymphocytes from seven species cross-reacted with ginbuna CD8 α mAb. High-reactivity group shared similar sequence characteristics with ginbuna CD4-1 and CD8 α , especially in terms of the candidate epitopes of antibodies. By comparing the sequences of each groups, we identified the potential candidate epitopes, including a few epitopes for CD4-1 mAb, and one epitope for CD8 α mAb.

Conclusion & Significance: The epitopes of our antibodies have been well-conserved in examined cyprinid species. Our antibodies will be available for analysis of the immune mechanisms in cyprinid fish. Furthermore, present strategy can be applied to predict the epitope recognized by antibodies in other fish species than cyprinid.

Biography

Ryuichiro Miyazawa, the second year student of the Doctor course, Graduate School of Veterinary Medicine, Nihon University. He has been involved in the studies on fish immune mechanisms using zebra fish and ginbuna as model fish. Recently, he found that monoclonal antibodies against ginbuna CD4-1 and CD8 α cross react with lymphocytes of zebra fish and other cyprinid fishes. He is interested in T cell function in fish and investigates the autoimmune mechanisms from an evolutionary perspective at present. Monoclonal antibodies against T cell subsets are indeed quite helpful to analyze T cell function in zebra fish suffering from autoimmune disease. He has published four papers in international journals including Miyazawa *et al.*, Dev. Comp. Immunol, 2016. He presented six papers at international conferences and domestic meetings.

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Effects of dietary phospholipids extracted from snails (*Buccinum striatissimum*) on the growth performance, stress resistance, immune response, and fatty acid composition of juvenile kuruma shrimps, *Marsupenaeus japonicus* (Bate)Amina S Moss¹, Shunsuke Koshio¹, Manabu Ishikawa¹, Saichiro Yokoyama¹, Truong H Nhu¹ and Mahmoud A O Dawoud^{1,2}¹Kagoshima University, Japan²Kafrelsheikh University, Egypt

To determine the effects of supplementing phospholipids (PL) derived from marine snails, *Buccinum striatissimum*, into the diets of juvenile kuruma shrimps (*Marsupenaeus japonicus*), a 40-day feeding trial was conducted. Five triplicate diets were formulated to contain varying levels of snail PL at 0%, 0.5%, 1%, 1.5%, and a negative control, where only Pollock liver oil was supplemented. Juvenile kuruma shrimps (initial body weight 1.96±0.14 g) were placed into 15-20 L capacity rectangular polyvinyl chloride tanks, with stocking density 10 shrimps per tank. The results showed that supplying 1% and 1.5% snail PL significantly improved growth in kuruma shrimps. Apparent feed efficiency ratio, specific growth rate and apparent protein efficiency ratio were significantly improved in diets that were supplemented by snail PL ($P<0.05$). Shrimps fed 1.5% snail PL had a significantly higher protein content ($P<0.05$) than other treatment groups. Stress resistance was also significantly higher in shrimps fed diets containing 1% and 1.5% snail PL, however no significance was found when comparing with the negative control. Furthermore, shrimps fed diets containing 0.5% and 1% snail PL had significantly higher amounts of total hemocytes count ($P<0.05$) than the negative control, while shrimps fed with 1% snail PL had significantly higher viable cells than the negative control ($P<0.05$). Higher levels of highly unsaturated fatty acids, especially C22:6n3, were found in shrimps fed with 1% and 1.5% of snail PL compared with other treatments ($P<0.05$). These results suggest that supplementing 1-1.5% snail PL was efficient in enhancing the growth, stress resistance, protein efficiency ratio and to some extent the immune response in juvenile kuruma shrimps.

Biography

Amina S Moss has graduated from the College of Bahamas with a Bachelor's degree in Biology minor in Chemistry, and has obtained her Master's degree in Fisheries Sciences from Kagoshima University, Japan by researching the use of marine snails in the feeds of Kuruma shrimps. Continuing with her passion in aquaculture and finding ways to use natural Bahamian resources to feed kuruma shrimps, she hopes to find optimum ways to grow marine shrimps and lobsters with locally available ingredients, including mollusks.

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